CLAIMS

What is claimed is:

1   1.   An apparatus, comprising:

2   a set in an n-way cache to have a max-age value;

3   a cache line in said set with an age; and

4   a max-age predictor to determine whether said cache line is

5   referenced fewer times than a threshold value, and if so then to select

6   said cache line for replacement.

1   2.   The apparatus of claim 1, wherein said age is greater than

2   said max-age value.

1   3.   The apparatus of claim 1, wherein max-age predictor has a

2   counter associated with said cache line.

1   4.   The apparatus of claim 3, wherein said counter is

2   saturating.

1   5.   The apparatus of claim 3, wherein said counter decrements

2   when said cache line is loaded.

1   6.   The apparatus of claim 3, wherein said counter increments

2   when said cache line is referenced.

1   7.   An apparatus, comprising:

2   a first cache to hold a first cache line; and

3   a correlating prefetcher to prefetch a second cache line from a

4   second cache when said correlating prefetcher determines that said

5   second cache line is correlated with said first cache line.

1   8.   The apparatus of claim 7, wherein said second cache is to
2   store a plurality of intra-set links and said first cache is to store a copy
3   of one of said plurality of intra-set links.

1   9.   The apparatus of claim 8, wherein said correlating
2   prefetcher determines that said second cache line is correlated with said
3   first cache line when said copy of one of said plurality of intra-set links
4   points at said second cache line.

1   10.   The apparatus of claim 8, wherein said copy of one of said
2   plurality of intra-set links is loaded into said first cache with said first
3   cache line.

1   11.   The apparatus of claim 7, wherein said second cache is to
2   store a plurality of least-recently-used bits and said first cache is to
3   store an age link derived from said plurality of least-recently-used bits.

1   12.   The apparatus of claim 11, wherein said correlating
2   prefetcher determines that said second cache line is correlated with said
3   first cache line when said age link points at said second cache line.

1   13.   A method, comprising:
2   setting a max-age value;
3   determining whether a cache line is likely to be referenced beyond
4   said max-age value; and
5   selecting said cache line for replacement when said determining
6   finds that said cache line is not likely to be referenced beyond said max-
7   age value.

1   14.   The method of claim 13, wherein said determining includes
2   comparing a value of a counter for said cache line to a prediction
3   threshold.

1   15.   The method of claim 14, wherein said counter is
2 incremented when said cache line is referenced at an age greater than
3 said max-age value.

1   16.   A method, comprising:
2   determining whether a correlation exists between a first cache
3 line and a second cache line in a second cache;
4   loading said first cache line into a first cache; and
5   prefetching said second cache line to said first cache when said
6 correlation exists.

1   17.   The method of claim 16, wherein said determining includes
2 preparing intra-set links in said second cache and transferring one of
3 said intra-set links with said first cache line when said first cache line
4 is loaded in said first cache.

1   18.   The method of claim 17, wherein said determining further
2 includes prefetching said second cache line when said one of said intra-
3 set links demonstrates said second cache line is correlated with said
4 first cache line.

1   19.   The method of claim 16, wherein said determining includes
2 preparing least-recently-used bits in said second cache and coupling an
3 age link based upon said least-recently-used bits with said first cache
4 line in said first cache.

1   20.   The method of claim 19, wherein said determining further
2 includes prefetching said second cache line when said age link
3 demonstrates said second cache line is correlated with said first cache
4 line.

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1   21.   An apparatus, comprising:

2   means for setting a max-age value;

3   means for determining whether a cache line is likely to be

4 referenced beyond said max-age value; and

5   means for selecting said cache line for replacement when said

6 determining finds that said cache line is not likely to be referenced

7 beyond said max-age value.

1   22.   The apparatus of claim 21, wherein said means for

2 determining includes means for comparing a value of a counter for said

3 cache line to a prediction threshold.

1   23.   The apparatus of claim 22, wherein said counter is

2 incremented when said cache line is referenced at an age greater than

3 said max-age value.

1   24.   An apparatus, comprising:

2   means for determining whether a correlation exists between a

3 first cache line and a second cache line in a second cache;

4   loading said first cache line into a first cache; and

5   prefetching said second cache line to said first cache when said

6 correlation exists.

1   25.   The apparatus of claim 24, wherein said means for

2 determining includes means for preparing intra-set links in said second

3 cache and means for transferring one of said intra-set links with said

4 first cache line when said first cache line is loaded in said first cache.

1   26.   The apparatus of claim 25, wherein said means for

2 determining further includes means for prefetching said second cache

3 line when said one of said intra-set links demonstrates said second

4 cache line is correlated with said first cache line.

1   27.   The apparatus of claim 24, wherein said means for
2   determining includes means for preparing least-recently-used bits in
3   said second cache and means for coupling an age link based upon said
4   least-recently-used bits with said first cache line in said first cache.

1   28.   The method of claim 27, wherein said means for
2   determining further includes means for prefetching said second cache
3   line when said age link demonstrates said second cache line is
4   correlated with said first cache line.

1   29.   A system, comprising:
2   a processor including a set in an n-way cache to have a max-age
3   value, a cache line in said set with an age, and a max-age predictor to
4   determine whether said cache line is referenced fewer times than a
5   threshold value, and if so then to select said cache line for replacement;
6   a bus to couple said processor to memory and to input/output
7   devices; and
8   an audio input/output module.

1   30.   The system of claim 29, wherein said age is greater than
2   said max-age value.

1   31.   The system of claim 29, wherein max-age predictor has a
2   counter associated with said cache line.

1   32.   The system of claim 31, wherein said counter increments
2   when said cache line is referenced.

1   33.   A system, comprising:

2   a processor including a first cache to hold a first cache line, and a

3 correlating prefetcher to prefetch a second cache line from a second

4 cache when said correlating prefetcher determines that said second

5 cache line is correlated with said first cache line;

6   a bus to couple said processor to memory and to input/output

7 devices; and

8   an audio input/output module.

1   34.   The system of claim 33, wherein said second cache is

2 coupled to said processor and is to store a plurality of intra-set links,

3 and said first cache is to store a copy of one of said plurality of intra-set

4 links.

1   35.   The system of claim 34, wherein said correlating prefetcher

2 determines that said second cache line is correlated with said first

3 cache line when said copy of one of said plurality of intra-set links

4 points at said second cache line.

1   36.   The system of claim 35, wherein said copy of one of said

2 plurality of intra-set links is loaded into said first cache with said first

3 cache line.

1   37.   The system of claim 33, wherein said second cache is

2 coupled to said processor and is to store a plurality of least-recently-

3 used bits, and said first cache is to store an age link derived from said

4 plurality of least-recently-used bits.

1   38.   The system of claim 37, wherein said correlating prefetcher

2 determines that said second cache line is correlated with said first

3 cache line when said age link points at said second cache line.